

WHAT IS CLAIMED:

1 1. A method for etching a tapered trench in a layer of material, said layer of
2 material having a mask adjacent a surface thereof which has an opening therein defining a
3 location on the layer of material at which the trench is to be formed, said method comprising:

- 4 a. performing a vertical etch process step on said layer of material;
5 b. enlarging the opening in said mask; and
6 c. repeating steps a and b above in an alternating manner until a trench has been
7 etched to a desired depth.

1 2. The method according to Claim 1, wherein said mask comprises a resist layer,
2 and wherein said enlarging step comprises performing a resist etch process step to enlarge
3 the opening in said resist layer.

1 3. The method according to Claim 2, wherein the resist layer is tapered around
2 a periphery of said opening to facilitate the resist etch process step.

1 4. The method according to Claim 2, wherein said vertical etch process steps and
2 said resist etch process steps are performed in a multi step process.

1 5. The method according to Claim 2, wherein said vertical etch process steps and
2 said resist etch process steps are performed in a pulsed etch process.

1 6. The method according to Claim 1, wherein said trench has a depth of from
2 about 10um to about 100um.

1 7. The method according to Claim 6, wherein said trench has sidewalls tapered
2 at a slope of from about 45 degrees to about 80 degrees.

1 8. The method according to Claim 1, wherein said layer of material comprises
2 a semiconductor substrate.

1 9. The method according to Claim 8, wherein said semiconductor substrate
2 comprises a silicon substrate.

1 10. The method according to Claim 1, and further including the step of
2 performing a metal deposition step in said trench when said trench has been etched to a
3 desired depth.

1 11. The method according to Claim 1, wherein said method is incorporated into
2 a process for fabricating a MEMS device.

1 12. The method according to Claim 1, wherein said method is incorporated in a
2 process for fabricating a high power RF device including a LDMOS and a VDMOS device.

1 13. The method according to Claim 1, wherein said method is incorporated in a
2 process for fabricating a Z-axis accelerometer.

1 14. The method according to Claim 1, including the steps of independently
2 controlling one or more of pressure, power, gas flows and time duration during the vertical
3 etch process steps.

1 15. A method for etching a tapered trench extending into a substrate from a
2 surface thereof, said method comprising:

3 a. providing a mask adjacent said surface, said mask having an opening defining
4 a location on said substrate at which said trench is to be etched;

5 b. performing a first vertical etch process step to form a first trench portion at
6 said location;

7 c. performing a first opening enlarging step for enlarging the opening in said
8 mask;

9 d. performing a second vertical etch process step to form a second trench
10 portion;

11 e. performing a second opening enlarging step for further enlarging the opening
12 in said mask; and

13 f. continuing to perform vertical etch process steps and opening enlarging
14 process steps in an alternating manner until said trench is of a desired depth.

1 16. The method according to Claim 15, wherein said mask comprises a resist
2 layer, and wherein said opening enlarging steps comprise performing resist etch process steps
3 to enlarge the opening in said resist layer.

1 17. The method according to Claim 16, and further including the step of tapering
2 said resist layer around a periphery of said opening prior to performing the first vertical etch
3 process step to facilitate performing the resist etch process steps.

1 18. The method according to Claim 15, wherein said trench has a depth of from
2 about 10um or less to about 100um or more.

1 19. The method according to Claim 18, wherein sidewalls of said trench have a
2 slope of from about 45 degrees to about 80 degrees.

1 20. An apparatus for etching a tapered trench in a layer of material, said layer of
2 material having a mask adjacent a surface thereof having an opening defining a location on
3 the layer of material at which the trench is to be formed, said apparatus comprising:
4 an etching tool for performing vertical etch process steps on said layer of material;
5 and
6 an opening enlarging tool for performing steps of enlarging said opening in said
7 mask, said etching tool and said opening enlarging tool operating in an alternating manner
8 to form a trench of a desired depth in said layer of material.

1 21. The apparatus according to Claim 20, wherein said mask comprises a resist
2 layer, and wherein said mask opening enlarging tool comprises a tool for performing resist
3 etch process steps on said resist layer.

1 22. The apparatus according to Claim 21, wherein said resist layer is tapered
2 around the periphery of said opening to facilitate performing of the resist etch process steps.

1 23. The apparatus according to Claim 21, wherein said vertical etch process tool
2 and said resist etch process tool are incorporated in a tool that operates in a pulsed manner.

1 24. The apparatus according to Claim 21, wherein said vertical etch process tool
2 and said resist etch process tool are incorporated in a tool that operates in a multi step
3 manner.